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XXXVIII. *An Account of some Experiments on the Sensibility and Irritability of the several Parts of Animals; in a Letter from Richard Brocklesby, M. D. F. R. S. to the Reverend Thomas Birch, D. D. Secr. R. S.*

Dear Sir,

Read June 19,
1755.

A New doctrine some time since propagated by a most faithful observer of the animal oeconomy, Dr. Haller, the illustrious commentator on Boerhaave's institutions, prevailed on me to do violence to my own temper, whilst I was to be witness to the success of most of the experiments, which have been mentioned in his *Dissertation upon the Irritability of animal Fibres*, as it deserves to be distinguished from sensibility.

Nothing short of the general importance of this inquiry could have induced me to be spectator of such cruelties, as indeed I have been within this month past. But as I shall anticipate partly the conclusions, that every gentleman conversant in such matters will draw from what follows afterwards, I am confident, that, however cruel my experiments may at first hearing sound in your ears, yet in the end you will conclude, that the pain and misery by me caused even to the victims of this subject, were to be regarded much less than what happens every day in Smithfield to twenty oxen and sheep, by cutting off their tails, and other parts of the skin, and driving them miles afterwards.

But

But to avoid, as much as might be, unnecessary privation of animal life, I selected at various times many objects, more than I shall, for a particular reason, at present relate; but most of them immediately devoted to death by the butcher for the use of the market, if I had not been present.

The first experiment I propose to relate, was made by cutting four inches of a young lamb's skin, which covered the great tendon of the hinder leg, and is known to anatomists by name of the *Tendo Achillis*. This of course caused violent struggles, and other marks of the injury felt; and on touching the extremity of the skin, whilst united to other parts of the animal, it cried loud, urined, and voided its excrement, when I poured diluted spirit of vitriol upon the edges of the skin, that were fixed to the contiguous parts; but did not express much pain by irritating the raised skin, at the farthest extremity of its separation, by an affusion of diluted spirit of vitriol. Nearer however to the fixed parts underneath, the sensation in the raised part of the skin continued much longer.

I then made the butcher cut into the tendon half way, and divide it upwards more than two inches, and attentively stood over the animal, to watch his motions, and discover if there was any apparent pain: but whilst that was doing, I could discern none, nor any marks of sensation in the animal, whilst I handled and pulled the cut tendon, nor yet any on touching it with dulcified spirit of nitre, and sharp acid spirit of vitriol; and what yet surprised me more, was to find the creature as insensible upon the tendon, as if it was a mere piece of glue, when I put a strong

muria of sea-salt and nitre all over it; and after a very few minutes I laid the raised part of the tendon in its natural direction, upon the correspondent fixed part, and they were both exactly congruous; so that the loose part had not contracted itself, nor was at all shorter, after these repeated trials, than its correspondent fixed part. I then put the creature on its legs, to see whether it had suffered so much, that it could not use the leg; but it was found to walk, though favouring greatly that side where so much had been done; however, it walked fairly on all its legs. After about five minutes torment, the butcher ended all its pains, and I performed the same processes on a sheep just destined to be slaughtered, in which I found all the appearances as above-mentioned.

I was induced to make two other very cruel experiments on different animals, by laying bare their patella's of the knees: having cut off all the skin round about, I then pricked and touched with the afore-mentioned escharotics the capsular ligaments of these joints, without discovering any tokens of pain thereby occasioned; but as soon as the sharp fluids had spread over the surface, so as to reach the extremity of the skin, the creature underwent as much pain as cutting before had caused.

I desired the butcher to take off as much skin from the forehead, as was necessary to perform the operation of the trepan; and before I began to apply the instrument to the sheep's forehead, I vellicated the pericranium with the end of a knife, but could not observe the membrane sensible, or thereby thrown into contractions; and when the operation was over, and the bone taken from the subjacent dura mater,

I poured

I poured on this membrane dulcified spirit of nitre, and diluted spirit of vitriol, and powdered common salt, but without perceiving any agitations whatsoever, brought on by these substances acting upon these living parts; though in some creatures I am dubious, whether sea-salt and nitre in powder did not create some sense, though no manifest contractions of the dura mater.

But every muscular part, which I cut while the animals were alive, discovered little sensibility of pain, though great propensity to irregular spasms of the fibres: and the muscles upon the thorax, and especially the carneæ columnæ of the heart, retained irritability last of all other muscular parts, even till long after the animal's expiration.

I laid the pungent liquors and salts, as above, upon various parts of the animal, yet alive; as upon the fat, cellular membrane of the neck, leg, and other parts within the skin, the liver, pancreas and spleen, and could not find them endowed either with remarkable sensibility or irritability; nor had the bladder any remarkable symptoms of irritability, farther than might be occasioned by its muscular fibres; though the well-known symptoms of the calculus shew its great sensibility.

I tried the effects of a strong aqueous solution of opium upon the irritated parts of muscular fibres, but could not perceive an opiate manifestly to compose these spastic motions of the parts, as Haller alleges they do: though in some trials I fancied there were grounds for such a conclusion. However this is no argument against the internal use of opiates, where the solids are greatly irritated.

I must add one more experiment, which I made upon the intestines of a lamb: after I had taken them from the carcase, I poured diluted spirit of vitriol on them, as well as several other pungent substances; and upon the touch of all of them, the intestines renewed their contraction, which before had totally ceased, and surprised me with a motion almost as strong as is found in the process of chylication; and this continued till the external cold had indurated and stiffened the fatty membrane of the omentum.

These were some of many experiments of a like nature, which the importance of these facts in daily practice of medicine required to ascertain, or reject; and, from the result of my repeated trials, I am induced to coincide with most of the conclusions drawn by Drs. Haller, Castell, and Zimmerman; that no part is sensible but the nerves only, and that some parts are irritable without sensibility accompanying them in any great degree; whilst others are altogether without sense, at the same time that they are incapable of being irritated at all.

Thus, Sir, according to your desire expressed in yesterday's conversation, I have communicated, for the amusement of some gentlemen of the Royal Society, a candid narrative of many of Dr. Haller's experiments, as repeated by me: and whether I shall, by prosecuting the subject still farther, be able fairly to make out, that irritability, as it is distinguished from sensibility, depends upon a series of nerves different from such, as serve either for voluntary motion and sensation, at present is impossible to say. But whatever shall be my future conclusions, I will establish nothing hypothetical, but endeavour by fair deductions

deductions to approach towards truth, as near as the abstruse nature of the subject will permit: And as I think I have actually found some variation from the common practice in rheumatisms, built upon the established fact of great irritability in the muscular fibres, succeed, to the relief of suffering patients, I cannot dismiss this subject, without relating, that only with gentle and continued frictions on the pained rheumatic parts with common salad oil, two poor patients, who lately applied for my advice in obstinate rheumatisms, were, by thus relaxing the crispation of the solids, surprisngly relieved, without any farther medicine. So that after bleeding, where it is indicated, which above all things I find abates irritability, it may deserve to be tried, how far animal oils, applied by friction long continued to the aggrieved parts, both in the gout, rheumatism, and other painful diseases, will ease the tortures, without repelling or obstructing the matter, which nature is labouring to throw off. But I forbear to enlarge, as the experiments I have hitherto made upon the subject of irritability, are scarce sufficient to obtain what Lord Bacon calls the *Vindemiatio prima* in this science. When I receive sufficient information to be convinced within myself, I shall not be wanting to communicate what may tend to advance this branch of natural knowledge, and to promote a true theory of diseases, upon which all rational practice must be established. I have now obeyed your friendly commands; and that the gentlemen and you may not think me tedious, I conclude with assuring you, that I am, Sir,

Your most obedient humble servant,

New Broad-street,
June 19, 1755.

Richard Brocklesby.